



CENTRAL SPINE

NEWSLETTER OF THE CENTRAL ARIZONA CACTUS & SUCCULENT SOCIETY
ON THE WEB AT www.centralarizonacactus.org

OCTOBER, 2007



PRESIDENT'S LETTER

DOUG DAWSON

Hooray! The sizzling summer days are over and we can all engage in our collective amnesia of summer past, only to remember how nice the weather will be for the next 8 months.

This is the time of year to carefully awaken our dormant plants like dudleyas, mesembs, bulbs, and other winter growers. These plants thrive on cool nights and warm days. It is also the time to plant seeds of many species which like to grow during the cool months. I re-extend my offer as I do each fall to have anyone in the club come over to my house and get lithops seed and other seed and a few lessons on how to get them growing. For example, lithops can bloom 3 years after starting the seed. Why not give me a call?

Many of you have attended this fall's DBG plant sale (Oct. 12, 13, 14). We represented ourselves well at the sale with nearly all time slots covered with 2 to 4 volunteers from our club, attempting to answer questions from customers who don't know how to grow the plants they are purchasing, but want desperately to get better at it ...and it's fun to talk plants with other people!

At the September Board meeting, Steve Martinez and Mike Cone were approved to organize and run the Spring, 2008 CACSS Show and Sale. Also, the initial organizational meeting for the Show and Sale will be at 7pm on Thursday, November 08. As well as some of our board members present, we need at least 3 or 4 members at large to be on the committee. This is very important, as many of you know, since we are currently undergoing a club dialog as to whether we should take on such a large task as the Show and Sale every year or every other year. Please take a chance and come to this first meeting to see if this might fit into your potential volunteer interaction. Without help from the members increasing, running such large activities comes into doubt. Let's roll up our sleeves and move forward in a positive and active way. By coming to the first meeting, you are not making a definite commitment yet. You are exploring a potential commitment and a great opportunity to gain friends who are movers and shakers. Please attend.

Call Ingrid (602.957.9865) for directions to the meeting which will be at her home.

Continued on page 3...

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THE COVER PHOTO

Echinocactus reichenbachii in the garden of Ron McKittrick, Yakima, Washington. Photo taken by the editor 05/28/07.

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LOCAL CALENDAR

October 25th, Thursday, 7 pm
Board Meeting
Home of Ingrid Swenson

October 28th, Sunday, Noon Setup, 2 pm Auction
Silent Auction of Member's Plants
Wildflower Pavilion, Desert Botanical Garden

November 8th, Thursday, 7 pm
2008 Show & Sale Committee Meeting
Home of Ingrid Swenson

November 18th, Sunday, 2 pm
Regular Club Meeting
Dorrance Hall, Desert Botanical Garden
Guest speaker will be John Weeks.

December 6th, Thursday, 7 pm
By-law Committee Meeting
Home of Ingrid Swenson

December 9th, Sunday, Noon
Holiday Party & Elections
Webster Auditorium, Desert Botanical Garden

January 27th, 2008, Sunday, 2 pm
Regular Club Meeting
Dorrance Hall, Desert Botanical Garden
Guest speaker will be Mark Muradian.

February 24th, 2008, Sunday, 2 pm
Regular Club Meeting
Dorrance Hall, Desert Botanical Garden

March 30th, 2008, Sunday, 2 pm
Regular Club Meeting
Dorrance Hall, Desert Botanical Garden

April 2nd - 6th, 2008, Wednesday - Sunday, All Day
2008 Show & Sale
Dorrance Hall & Boppart Courtyard, Desert Botanical Garden
April 2nd, Wednesday: Show setup
April 3rd, Thursday: Show judging & vendor setup
April 4th - 6th, Friday - Sunday: Show & sale open to the public

REGIONAL CALENDAR

October 27th, Saturday, All day beginning at 10 am
Mesemb Day 2007
Home of Tim Jackson
Phelen, CA

June 12th - 15th, 2008, Thursday - Sunday, All Day
12th Biennial Mid-States Cactus & Succulent Conference
Grand Junction, CO
Visit <http://www.midstatesconference.org> for more information.

April 10th - 15th, 2009, Friday - Wednesday, All Day
33rd Biennial CSSA Convention
Westin La Paloma Resort, Tucson, AZ
Visit <http://www.cssainc.org> for more information.

FALL SILENT AUCTION

The cool fall weather has brought about increased growth in my plants, which means I am, again, running out of room to house all of my plants, especially the seedlings. Good thing the fall silent auction is just a week away! Now I just have to decide what I can bear to part with. I've got 5" pots bursting with *Adenium* cv. seedlings; I think I can spare a few. There's also Aloes, Bulbs, Gasterias, Haworthias and Sansevierias that can stand to be divided; I think I can spare a few of those too. Maybe some Aloe, *Bursera* or *Commiphora* seed.

I list all of the above to show you how easy it is to come up with a few donations for the silent auction. And unlike myself, if you have the unfortunate disposition of not being completely consumed by your plant collection, and don't have anything to donate, just show up with your wallet and I, as well as other club members, will help you increase your collection!



Adenium cv. "Moonlight Fairy"

Items to remember for those bringing plants:

- Make sure that your plants are pest/disease free.
- Fill out an auction card with the name of the plant, any specific cultural conditions, and your contact information so that the winner of the auction can contact you with any questions. An auction card template can be found on our website at <http://www.centralarizonacactus.org/AuctCard.pdf>.

If you have any questions, feel free to contact me.
Cynthia Robinson

PRESIDENT'S LETTER ...continued from page 1.

Coming up:

1. Our next board meeting will be Thursday, Oct. 25 at Ingrid's house. All CACSS members are always invited to attend our board meetings.
2. Our next regular meeting will be the Sunday, Oct. 28 large silent auction at 2pm at the Wildflower Pavilion at the DBG. Please contribute plants and materials and/or come with money in your pockets to take home some new plants for your collection. Encourage a friend to come too, since the silent auction is open to all. If you have any questions, call me at 480.893.1207.
3. Instead of a regular December meeting, it is our club's tradition to have a potluck social, this year on Sunday, Dec. 09, at Webster Auditorium at the DBG. I always look forward to this time of socializing, and always good food - and yes, I will bring my homemade English toffee again. This is a great opportunity to feel really included in the club. We will also take about 10 minutes to conduct some very important business: election of the 2008 board and officers. Are you marking your calendar?
4. Nomination committee for the 2008 slate is now ongoing. Please pick up the phone and call Gard Roper (602.996.9745) to let him know you are interested in becoming a board member. You don't need to wait for someone else to nominate you; nominate yourself - many of us started that way. Don't feel intimidated that you are not sure what the job entails, we provide on-the-job training.

Well, back to planting my seeds...

Doug

FERTILIZING AND AUTOMATIC FEEDING

LEO MARTIN

Plants require water, light, carbon dioxide in substantial amounts, a place to put their roots, and some additional nutrients, typically taken up through the roots with the water. So-called major nutrients are nitrogen, phosphorus and potassium. The amounts of these contained in fertilizers are represented on the label as relative percentages, listed as N - P - K, for nitrogen, phosphorus, and kalium (Latin for potassium.) Minor nutrients, necessary in smaller or even trace amounts for plant survival, include iron, magnesium, calcium, copper and a few others. They may not be in some fertilizers. The label will tell.

Especially in artificial soil mixes, our plants will require supplemental fertilization. Most bagged 'cactus mix' and home-made combinations intended for succulents contain things such as bagged potting soil (which is mostly sawdust--"forest byproducts"), coir, peat, sand, pumice and perlite. Such mixes lack almost all minerals and nitrogen. Plants may survive in such mixes for a while but will not grow and bloom.

House plants are even worse off; growing in nothing but standard bagged potting soils, they receive no nutrients of any kind unless Lady or Lord Bountiful feeds them regularly. This is why so many house plants wither, yellow, and dwindle away within a few months of purchase.

Mixes containing large proportions of real soil from the Earth contain most nutrients plants need, lacking only nitrogen; our desert soils are rich in minerals. Plants potted in desert soils will live and grow (slowly) for years without fertilizing, but benefit from supplemental nitrogen feeding.

I will talk mainly about desert plants growing in the desert. Other plants have other nutrition requirements; that would be another article.

Nitrogen

Plants use nitrogen to build amino acids. Amino acids are then strung together like beads to form proteins. Proteins serve many functions. Some serve as chemical catalysts, allowing the plant to make all its other chemicals; some assist in trapping sunlight to form sugar from carbon dioxide; some string the sugars together end to end one way to form starch, and another way (which we can't digest) to form cellulose, the major structural material of plants.

Nitrogen constitutes 70% of our atmosphere. It exists in the form of an invisible gas consisting of two nitrogen atoms bound together into one very stable molecule, N_2 . But, plants can take up nitrogen only in the form of nitrate, which is one nitrogen atom bound to three oxygen atoms, and which is chemically unstable in water solutions.

Plants cannot split atmospheric nitrogen to form nitrate; only certain bacteria, some fungi and lightning are able to do this. Normally, these nitrogen-fixing bacteria perform this trick in the soil, and plants may take up the excess nitrates. The legume family (Fabaceae) has learned to house nitrogen-fixing bacteria in small root nodules. This is why so many desert trees are legumes: desert soils are very poor in nitrogen, and the guest bacteria provide food for the host. Inoculant for bean seeds consists of spores of these bacteria. I inoculate all seeds I sow in the bean family, including Acacia, Delonix, and Erythrina, as well as garden beans and sweet peas.

Other soil bacteria decompose proteins in the soil to nitrates. American Indians discovered this; they taught the pilgrims to put a fish in a hole, backfill, and then plant three kernels of corn over the fish. All our succulent plants benefit from supplemental nitrogen, and plants in non-soil mixes require it or they will not grow.

Phosphorus and Potassium

Plants use phosphorus to make adenosine triphosphate, which plants (and all other living things) use as an energy source for chemical reactions. Soil phosphorus exists mostly in the form of phosphates in combination with calcium or sodium. Phosphates tend to be very insoluble, accumulating in soils over the years. Desert soils are extremely rich in phosphates, and our plants in the ground don't need any extra. Plants in low-nutrient mixes need it, though.

Potassium is found in relatively high amounts in the sap or blood of all living things. It is needed for keeping cells alive, and for proper functioning of many enzymes. Our desert soils contain plenty of potassium, but soilless mixes don't.

Iron and Magnesium

Plants make chlorophyll (the protein enzyme they use to trap sunlight) using for tools enzymes containing iron. Each molecule of chlorophyll itself contains one atom of magnesium. So, deficiencies of either of these minerals will lead to

plants without adequate chlorophyll - they turn yellow, which we call chlorosis. Desert soils contain plenty of both minerals, but our soil acidity is low, and this inhibits uptake of these minerals into plants' roots. Warm weather and overwatering worsen this situation. This is why many exotic landscape plants turn yellow in the heat without either lots of supplemental iron or attempts to make soil more acid; we have to keep these exotics wet to keep them alive during periods of high heat, and we also need to give them extra iron or acidify their soil.

Calcium and Trace Minerals

Plants need calcium to form some woody structures like skeletons and spines, and it is a necessary cofactor for actions of most protein enzymes. Our desert soils are rich in calcium, so plants in the ground don't need extra. Copper is used as a cofactor for a small number of enzymes. We have plenty in our desert soils. Of interest, according to bromeliad specialty nursery Tropiflora, the whole family Bromeliaceae, containing vase plants such as Aechmea, pineapples (*Ananas comosus*), *Dyckia*, *Hechtia* and *Tillandsia*, is very sensitive to copper, and it is best not to use copper-containing fertilizer on these plants.

What Product to Use

So, the question is, how to feed our succulent plants?

Controlled-release fertilizers, such as Osmocote™ or ammonium phosphate, seem attractive. They promise 3, 4, or even 9 months of slow-release feeding if mixed into potting soils. Unfortunately, these results are for temperatures in the 70s to 80s. Nitrogen-containing compounds not taken up by plants are decomposed by soil bacteria to molecular nitrogen, N₂. The hotter it is, the faster the bacteria chop up the nitrogen compounds. With temperatures over 90, controlled-release fertilizers actually provide nitrogen to plants for only a few days to weeks. I have concluded they are an expensive waste of time for desert gardeners.

Dry, quick-release fertilizers can be sprinkled on the soil or potting mix, then watered in. There are "complete" fertilizers available, containing major and minor nutrients, and dry fertilizers containing nitrogen compounds only, such as ammonium sulfate, calcium nitrate, ammonium nitrate and urea.

The problem with the scatter and water method of fertilizing is that it is too easy to overfertilize and burn plants' roots, leading to a sick or dead plant.

Liquid fertilizers are simpler to use; just mix and water. Most are sold as powders to be dissolved in water. There are "complete" liquid fertilizers, such as MiracleGro™ and Peters™; one can also dissolve ammonium sulfate in water. Most people use somewhere between 1/2 teaspoon to 1 tablespoon of any of these per gallon of water when fertilizing their plants. It is harder to burn plants accidentally with mixed liquid fertilizers, since the gardener controls the concentration in the water.

I have concluded watering with liquid fertilizer is the best way to fertilize my plants. I grow my container plants in desert soil, so I only need to provide nitrogen. Instead of "complete" fertilizers, I use ammonium sulfate, which contains nitrogen in the form of ammonia.

Plants in soilless mixes of coir and pumice or the like require "complete" fertilizers on a regular basis or they will not grow.

What Kind of Nitrogen to Feed

Soil bacteria break down ammonia dissolved in water to nitrate, which can be taken up by plants. This happens faster at warmer temperatures, and slower at cooler temperatures. Under about 60 degrees it happens very slowly, so ammonium sulfate is not considered a good winter fertilizer. However, when it is above 90 degrees, almost all the ammonia will be converted to nitrate very rapidly, and be available for uptake by plants. Nitrate unused by plants, in turn, will then be converted to nitrogen very rapidly. Most rapid-acting nitrogen fertilizers are essentially gone within an hour in the summer.

One may read ammonium sulfate is poor fertilizer, breaking down too quickly, and longer-lasting nitrogen sources such as urea are better. This is good advice for people living where summer temperatures hover in the 70s or 80s. In our high summer temperatures, though, it is not correct. Any quick-release nitrogen fertilizer used here in the summer will be metabolized to air within just a few hours. Use whatever is cheapest, which is ammonium sulfate.

Because of rapid metabolism at high temperatures, it is a waste of money to buy calcium nitrate or ammonium nitrate fertilizer for summer use; ammonium sulfate works just fine. However, in cooler weather, calcium nitrate or

ammonium nitrate may be a better choice, since nitrate is already available without intervention of winter-sluggish bacteria. These fertilizers are twice or more as expensive as ammonium sulfate. Our cacti don't need feeding in cooler weather, but winter-growers such as some Aloe, Haworthia and mesembs like it a lot.

Blood meal or dead animals do break down more slowly in the soil, releasing nitrates, but they also attract animals who want to dig up your plants to get the tasty treats. I recall reading a 150-year-old English gardener's book which recommends wrapping a dead rat in a cloth and burying it in a large decorative container to hold a parlor palm. I don't recommend this.

Cacti Must Be Fertilized

And, one may read cacti and other succulents shouldn't be fertilized! This is silly. Plants in the wild have soils rich in minerals, and in many desert areas blue-green algae live on the surface, converting atmospheric nitrogen to nitrates. If you have hiked in the desert you may have seen, in areas where water would collect after a good rain, thin black or dark-green peeling layers something or other. This is a blue-green algae called Nostoc. It has been shown this symbiosis occurs in Namibia; it would be a great research study for a student here. Plants in soilless mixes don't get any nutrients at all. They must be fertilized to grow.

Fertilize Cacti in the Evening

Recall cacti and other succulents using C4 metabolism open their pores and take in water at night only. Fertilizing on a summer morning is mostly a waste of time; the plant's pores are closed, and won't be open until dark, by which time the nitrogen in the fertilizer will have been converted to air. Fertilize in the late afternoon or evening to be sure the plants clean their plates.

How Often to Feed

Ideally one would provide a very dilute fertilizer solution at each watering, with occasional fresh waterings to rinse out accumulated salts. This way the plant will have nutrients available whenever it decides to grow, and equates to people eating frequent light and healthy snacks during the day. The way most people water, giving a full-strength blast every 2-8 weeks or when they remember, is like a person going on a fast, then breaking down and bingeing on 5 pounds of Sees Candies™ at one sitting.

Fertilizer Injectors

But, somebody has to mix the fertilizer, and it has to be mixed just before use, or hot temperatures will set to work on the ammonium and nitrate. I have watered hundreds of plants at a time with liquid fertilizer I mixed in 1-gallon containers. What a pain! One can also mix a large quantity at once, perhaps in a barrel or large plastic container. Then one must dip out pitchers of fertilizer water. There must be an easier way?

There is. One can buy fertilizer injectors at reasonable prices. These work on a siphon principle: the injector uses water flow to siphon measured amounts of concentrated fertilizer solution from a bucket or barrel, and puts it in the main water flow at a predetermined dilution. If attached to a garden hose, the water flowing from the end of the hose contains fertilizer at the chosen concentration. Work is greatly reduced; one must only mix the concentrate in the bucket or barrel.

Simple, Slightly More Work

An inexpensive and very well-made injector is the Dramm Syphon Ject™ (www.Dramm.com; less than \$20 at many nurseries.) It is a brass fitting with a side nipple onto which fits a rubber tube weighted at one end with a filter (Figure 1.) The fitting screws onto a standard hose bib and a standard garden hose then screws onto the injector (Figure 2.) The rubber tube slips on the nipple and the filter end is dropped in a bucket containing concentrated fertilizer solution (Figure 3.) When the hose is running, the injector siphons concentrate from the bucket and yields a fixed dilution ratio of 1:16. One gallon of concentrate will be diluted to 16 gallons of fertilizer solution. This is governed by the size of the internal siphon channel and cannot be changed.



Figure 1: Brass injector and rubber aspirator line.

This injector only works at relatively high water flows. The water flow needed is really too high for plants in smaller pots unless one uses a good watering wand to break the stream. One can also use the hose to fill a watering can or another barrel and avoid the trouble of picking up a measuring spoon with wet hands, then dipping into the fertilizer container.

Sixteen seems a strange number to pick for dilution ratio until one realizes there are 16 tablespoons per cup. Peters™ and MiracleGro™ suggest using 1 tablespoon per gallon of water for fertilizing plants. So, to yield a concentration of 1 tablespoon per gallon coming out of the hose, each gallon in the concentrate bucket should contain 16 tablespoons (one cup) of fertilizer powder. If you prefer weaker fertilizer, calculate accordingly. For example, if one prefers 1/2 teaspoon per gallon, into the bucket one would put 16 times 1/2 teaspoon or 8 teaspoons per gallon of concentrate. A 5-gallon bucket of concentrate will yield 80 gallons of fertilizer solution.

The system must be rinsed with clean water and dried after each use to prevent corrosion. Simply put the rubber siphon in a bucket of clean water, turn on the hose and run a gallon or so through the injector. Remove the brass fitting and rinse it thoroughly. Let both pieces dry in the shade. The rubber tubing must be stored out of the sun; preferably in the house, since high temperatures age rubber rapidly. When the tubing finally wears out it can be replaced at any hardware store. Take the old piece and brass injector along to ensure getting the proper replacement. The Dramm Syphon Ject™ should last many years with proper cleaning.

Less Simple, More Automatic

The next step up is installing an inline injector for your irrigation system. Rodney Anderson, who grows wonderful palms and cycads, began using this system years ago. Monte Crawford in our club inspected Rodney's system and installed one of his own. They taught me what they do. They evaluated all the products on the market and found the best one: the Chemilizer Chemical Injector™ (www.chemilizer.com, or you can call them in Florida for a brochure: 727-518-1665.) There is an enormous amount of information on their Web site.

The Chemilizer™ consists of a pitcher-sized blue water pump (item CH9000-210, \$280, see Figure 4), and a juice-glass-sized white chemical pump and cap (items FG9210-V and FG9936-V, \$55 for both, see Figure 5.) The water pump is plumbed into the incoming irrigation line. The chemical pump is inserted at the bottom of the water pump. A length of tubing is inserted onto a nipple on the chemical pump, and the other end is placed in a barrel or bucket of fertilizer concentrate. Be careful; it is easy to break off the nipple when installing the pump.

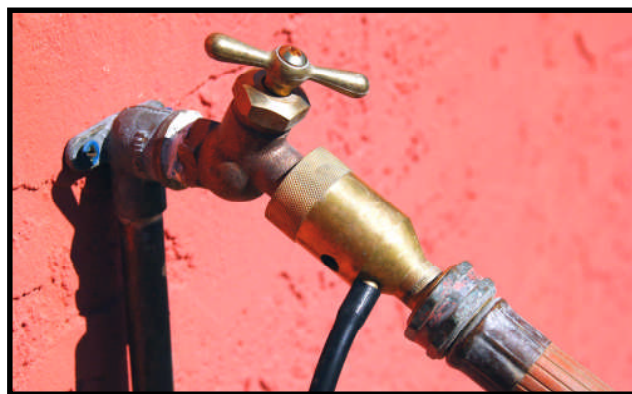


Figure 2 (Top):
Injector attached to hose bib;
aspirator attached to injector.

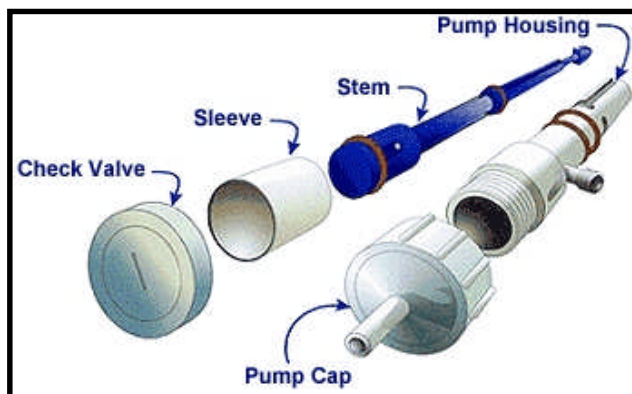


Figure 3 (Left):
Aspirator line in bucket.

Figure 4 (Below):
Chemilizer water pump.
White chemical pump visible
at bottom.



Figure 5 (Bottom):
Chemilizer chemical pump.



I recommend buying a spare cap or two in case this happens.

When water is running, the flow through the water pump activates the chemical pump, which sucks concentrate from the barrel and puts it in the water main just downstream from the water pump. A great advantage of this system is that it provides a constant dilution at any reasonable flow rate, unlike the Syphon Ject™, which must be run at high flow.

This system is plumbed into an irrigation line. It is not hard to do yourself, though since I'm lazy, I paid somebody else to do it. It works fine with standard PVC pipe. A typical plumbing diagram is here: (Figure 6.)

It could also be used as a portable system, mounted on a rolling cart: attach a female brass hose fitting on the inlet side, and a male brass hose fitting on the outlet side. Use a short hose to attach to a hose bib, and attach the watering hose to the pump outlet.

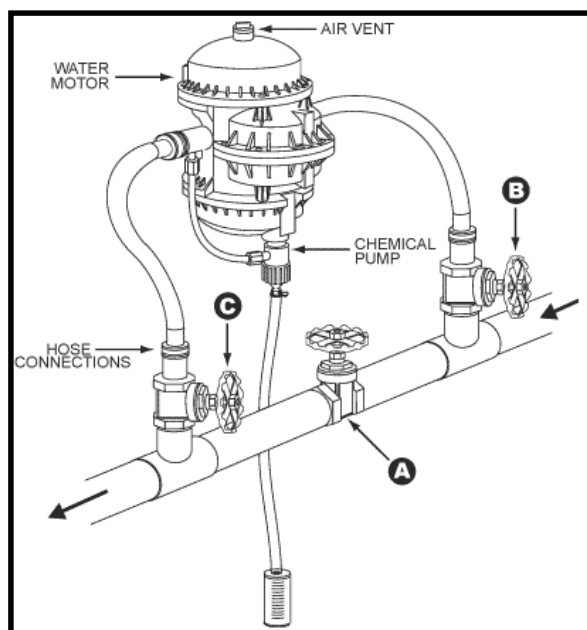


Figure 6: Injector plumbing diagram.

The company developed this system for industrial chemicals, and only later realized it could be plumbed into irrigation systems to provide continuous feeding. Many applications are on their Web site. I have mine plumbed into the intake water pipe to 9 of my irrigation lines. (I have one drip line for patio pots, three soaker hose lines for my orchard, and one drip line each for landscape cacti, landscape succulents, landscape shrubs, landscape cycads, and my rose bed.) There is a bypass valve system so I can exclude the pump from the system and irrigate with fresh water. I can use different fertilizers for different lines by switching the chemical pump intake tube from one concentrate barrel to another. I use pH adjusted, balanced fertilizer for my cycads and ammonium sulfate for the other lines.

Chemilizer™ makes 2 kinds of pump systems: one provides a fixed dilution, which depends on the chemical pump inserted into the water pump; the other can provide variable dilutions, which require some calculations and some work. The variable pump is also almost twice as expensive. I bought the 1:100 fixed-dilution chemical pump, meaning I mix the concentrate 100 times as strong as what I want the plants to get. I only have to run the calculations once and then I know how much fertilizer to add to my barrel. I add 2 cups (32 tablespoons, 96 teaspoons) of dry ammonium sulfate per gallon of water in my concentrate barrel to yield just under 1 teaspoon ammonium sulfate per gallon of watering solution.

One may also plumb a hose bib downstream from the Chemilizer™. Then any water from that hose bib - or any bucket filled there - will contain fertilizer. Don't drink from that hose bib!

Acidifying Water

There was quite a discussion in our August meeting about putting vinegar in the water. Why?

Our desert soils are quite alkaline. This is because rain falls and dissolves minerals. As the rain moves downhill it brings with it extra minerals, and then the water evaporates near the soil surface in flat areas. Rains are relatively brief so desert soils tend not to get wet very far below the surface. Over many years, all these imported minerals become concentrated near the surface of the soil since they are never leached down and away. One can see the same thing around a drip irrigation emitter - at the margin of the wet soil zone a white mineral layer builds up over time. These minerals tend to be things like calcium and magnesium phosphates and carbonates, which are quite insoluble. They render the soil alkaline. Excessive concentration of these minerals over many years forms caliche.

The Infamous Crime Against Nature

Most desert plants in the ground do fine in alkaline soils. But, it is highly unnatural to grow plants in containers. Every watering, water left in the pot will dry, leaving another load of dissolved minerals. One sees this as the white mineral buildup on clay pots. This mineral load dissolves clay and ceramic pots - think what it does to your plant's roots. From a plant's perspective, pots are dungeons, torture chambers.

Hospitality for Foreign Guests

Exotic plants, from non-desert areas, rarely appreciate alkaline soils. Many of our favorite caudiciform succulents are

not from desert areas, rather from summer-wet, winter-dry areas. They appreciate less alkaline soil, whether in the ground or in a container. Going a little farther afield, many common landscape plants also do better in less alkaline soils; things like roses, vegetables, jasmine, honeysuckle. Cycads will grow fine in our alkaline soils, but if irrigated with more acid water, they grow spectacularly and look much bluer.

The simplest but slowest way to decrease alkalinity in the soil is to maintain a 6 inch layer of organic mulch at all times. Soil bacteria will take care of the rest if you don't kill them with RoundUp™. If you have any kind of fruit trees or rose beds, you absolutely must do this for best results here in the desert. But, mulching doesn't work in a 4" clay pot.

Eliminate Container Salt Buildup

For container plants, the most effective way to decrease alkalinity is to add a tiny bit of acid to your water. You must not guess; desert plants don't like soil that is too acid.

Note that using ammonium sulfate for fertilizer helps acidify the soil. Once the ammonium is gone, the sulfate (which is part of sulfuric acid) helps decrease the alkalinity: Another reason to use ammonium sulfate.

Be Careful!

Inorganic acids such as hydrochloric acid (also called muriatic acid, and used in swimming pools) and sulfuric acid can be used, but they are dangerous. Don't use these unless you have been trained in handling them and you don't mind holes burned in your clothing. Remember what parts of you are situated right at the level where you tend to carry a bucket or spill things, protected only by thin cotton cloth. And, always use proper skin and eye protection. My lab partner in general chemistry splattered muriatic acid on the front of his cotton polo shirt. The shirt (an expensive Izod, back when that was tres chic) disintegrated and fell off him. He had blisters across his chest and abdomen. Fortunately he was wearing goggles and lab gloves.

Organic acids such as acetic acid work well, too. Vinegar is a dilute solution of acetic acid which most people consider safer to handle than inorganic acids. Be careful and measure! Undiluted vinegar can be sprayed on weeds to kill them. Vinegar contains carbon, and can be used as a nutrient by many plants and bacteria. In humid climates, adding vinegar to the water for plants in pots leads to a prodigious growth of moss on the pot and soil; in our low-humidity climate we don't have to worry about this.

Whichever acid one chooses, guesstimating how much to add might lead to harming plants. One must measure the acidity of the water and add the proper amount of acid to correct it just right. Acidity may be measured with pH paper or a swimming pool pH measuring system. pH is a measurement of acidity/alkalinity using a scale from 1 to 14. The higher the pH, the higher the alkalinity. The lower the pH, the higher the acidity. The inside of your stomach is pH 1 (unless you take the little purple pill.) A concentrated solution of lye in water is pH 14. Neutral - not acid, not alkaline - is pH 7. Our desert soils tend to be around pH 8 or higher.

How Much to Use?

Before acidify water, one must know the starting pH. First, use pH paper or a swimming pool test kit and find the pH of tap water. Then, put a quart of tap water in a larger, non-metal container (metal interacts with the acid you will add.) Add a few drops of acid, stir well with a glass or plastic implement, and check the pH again. Keep a careful record of how much acid is added. Continue this routine of adding a few drops of acid - stirring - checking the pH until the pH is in the range 6.5 - 7.0. This is called an acid titration.

To double check, start with a quart of fresh water. Add the entire amount of acid you calculated and stir. Check the pH. It should be the same number as before. Multiply by four to find the amount of acid needed to bring 1 gallon of tap water to the desired pH. If using a bucket and Dramm Syphon Ject™, add sixteen times this amount to each gallon in the concentrate bucket.

Fertilizer water can also be acidified. But, the fertilizer itself will change the pH of the solution. So, do not simply add the amount of acid needed for tap water to a fertilizer solution. Rather, do an acid titration starting with the fertilizer solution.

Take a quart of fertilizer solution of the concentration to be used. Check the pH, add acid drop by drop, and check pH frequently to find how much acid to add to a fertilizer solution. Record this number. For injector watering with acidified fertilizer solution, add the dry fertilizer to the empty bucket, then half the water, then the acid, then the rest of the water. Stir. Drop in your suction tubing and go to town. Remember to rinse your injector when done.

FERTILIZING AND AUTOMATIC FEEDING ...continued from page 9.

Municipal water tends to be very constant in terms of alkalinity. So, once you figure out an acid titration you won't need to repeat it.

I don't acidify the water for my landscape plants, except for the cycads. But I do use my Syphon Ject™ to mix ammonium sulfate and vinegar for my potted plants.

Try it and see.

Chemilizer™, Dramm™, Dramm Syphon Ject™, MiracleGro™, Osmocote™, Peters™, RoundUp™, Sees Candies™ and Tropiflora™ are trademarks of their respective companies. ❧

FROM THE EDITOR'S DESK

It's hard to believe that this year is quickly coming to a close. I hope everyone has enjoyed the informative and entertaining articles that they have read in this year's *Central Spine*. The *Central Spine* would not be the quality publication that it is, if it wasn't for the frequent contributions from club members Lee Brownson, Doug Dawson, Ray Daley, Jim Elliott, Tom Gatz, Sue Hakala, Leo Martin, Daniel Sumberg and Bob Torrest, as I simply don't have time to do a lot of research for quality articles. That being said, I would like to make a request to the rest of the club members. I would like to resurrect the monthly column featuring a member and how that member became involved in cactus and succulents. If you would like to participate, please call me at (602-615-2261) or email (crobin500@msn.com) and I will give you more details.

Important items to look for in upcoming issues of the *Central Spine*:

- **The November issue will contain your membership renewal form.** I plan on having this form as a separate sheet of paper inside the newsletter which will be pre-filled out with your member information. You will want to verify that the information is correct, make any corrections, if necessary, and return it with your 2008 dues. Most importantly, there will be a box to check if you would like to opt-in for the emailed version of the *Central Spine* and discontinue the printed version. It is not a requirement, simply an option.

A few benefits of going to the emailed version are as follows:

- First and foremost, you will be able to see all of the photos in glorious color (and it does make a difference).
- Secondly, you will be helping the club save money on the increasing cost of printing and mailing the newsletter. Each issue costs approximately \$1.50/copy to print and mail a 10-12 page newsletter printed on plain paper. Add additional pages or change to (my preferred) laser paper and the cost goes to nearly \$2.00/copy, which is more than the club's budget. Without cost constraints, I would be able to publish all of the articles that I receive in the month that I receive them and you would have more information to broaden your minds with.
- And finally (for now), you would be saving me a large sum of time. There would be less printer issues to deal with, less newsletters to fold, seal, address and stamp, and less time spent at the post office. With the emailed version, all I would have to do is add your name to my distribution list; after that, it is just point and click, and the newsletter is on its way to your Inbox.

Think about the benefits as well as the reason why you are still receiving the printed version, and let me know if you'd like to try it. You can even elect to receive both versions so that you can compare the difference. Most members who have opted for this switch entirely to the emailed version after a couple of months.

- Leo Martin's popular series about the 2007 CSSA Convention will continue in the November issue.

As always, I appreciate all articles, photos and suggestions submitted. This is your newsletter; if there is any specific topic that you would like featured, just let me know.

Cynthia Robinson ❧

NOMINATIONS FOR 2008

The leadership of the Central Arizona Cactus and Succulent Society will be chosen at the December General Meeting on December 9th. The election will be held during our annual Holiday Party. Please plan to attend so that you will have input into the future direction of the CACSS. The nominating committee's slate of names is incomplete because we are still looking for someone to be Secretary of the Board (anyone care to volunteer?). The slate is as follows:

President - Steve Plath (current Board member)
Vice President - Lee Brownson (current Board member)
Treasurer - Wayne Whipple
Secretary - ????

Board Members:
Leo Martin (new to Board)
Steve Martinez (new to Board)
Julie Plath (current Secretary)
Cynthia Robinson (current Board member)
Lois Schneberger (current Board member)

Other people may be nominated for any office or Board seat at the meeting.

Lee Brownson
Nominating Committee ☞

ARIZONA PALM AND CYCAD ASSOCIATION MEETING

Members of the Central Arizona Cactus and Succulent Society are invited to attend a very special presentation, at one of our member's home.

World renowned cycad expert, Loran Whitelock, will be the guest speaker at the next meeting of the Arizona Palm and Cycad Association on Saturday, November 10th, 2007. The location is the home of Monte and Cynthia Crawford, 945 N. LaBarge Road, Apache Junction, Arizona. He is the author of the cycad "bible", *The Cycads*. Mr. Whitelock rarely leaves California to give presentations.

Since seating is very limited, the gathering is open only to paid members of either the Arizona Palm and Cycad Association or (for travelers) the National Cycad Society. We will accept payment to join the Arizona Palm and Cycad Association on the day of the event.

Doors open at noon, presentation at 2 p.m. Saturday, November 10th, 2007.

For more information visit <http://www.azpalmandcycad.org>. ☞

THANK YOU, FROM THE DESERT BOTANICAL GARDEN

A Message from Cathy Babcock

Thank you to all CACSS members who volunteered at the Desert Botanical Garden Fall Plant Sale Festival. Your help is greatly appreciated by the Garden and by our guests, the general public, who look to your expert advice for help growing plants. ☞



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ARTICLE SUBMISSION DEADLINE FOR NEXT
CENTRAL SPINE ISSUE IS: NOVEMBER 5, 2007
EMAIL TO CROBIN500@MSN.COM

PLANT QUESTIONS???

WHOM TO CONTACT!!!

Many CACSS members have experience with different kinds of succulent plants. I hope they will add their names to the following list (just call or e-mail Bob Torrest). For now, the list is simply alphabetical with principle interests. When more members add their information, the list will be cross-referenced by topic.

DOUG DAWSON
480-893-1207
doug.dawson@gmail.maricopa.edu

Specialization includes Flora of Namibia, Growing from Seed, Lithops, other Mesembs & Melocactus.

MIKE GALLAGHER
602-942-8580
mgallagher26@cox.net

Specialization includes Aloes, Haworthias, Columnar Cacti & Turbinicarpus.

STEVE PLATH
623-915-7615
revegdude1@juno.com

Specialization includes Ariocarpus, Astrophytum, Cyphostemma, Echinocereus, Fouquieria, Thelocactus, General Propagation & Desert Revegetation.

CYNTHIA ROBINSON
602-615-2261
crobin500@msn.com

Specialization includes Flora of Madagascar, Growing from Seed, Caudiciform & Pachycaul Succulents, Aloes, Apocynaceae, Burseraceae, Euphorbiaceae, Fouquieriaceae, & Succulent Bonsai.

BOB TORREST
480-994-3868
robertst9114@msn.com

Specialization includes Desert Landscaping, Unusual (including Rare Fruit) Trees & Shrubs, Aloes, Agaves, Columnar Cacti, Trichocereus & Opuntia.